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NOMA & SON PATENT

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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF

SHIN YAMAGUCHI, ET AL.

: EXAMINER: L. ROBERTS

SERIAL NO: 10/791,783

FILED: MARCH 4, 2004

: GROUP ART UNIT: 1614

FOR: DENTAL BLEACHING AGENT SET AND THE METHOD FOR BLEACHING  
TEETH

DECLARATION UNDER 37 C.F.R. § 1.132

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VA 22313-1450

SIR:

Now comes Shin Yamaguchi who deposes and states:

1. That I am a graduate of Gunma University and  
received my Master's degree in the year 1997.
2. That I have been employed by GC Corporation  
for 9 years as a researcher  
in the field of dental materials especially whitening material.
3. That I am a co-inventor of the above-identified application.
4. That the following experiments were carried out by me or under my direct  
supervision and control.

**TEST DATA****1 SAMPLES**

1. Extracted bovine teeth were immersed into ferrum acetate solution for 24 hours under vacuumed condition.
2. After that, they were immersed into tannic acid solution for 24 hours under vacuumed condition to make tannic acid staining.

**BLEACHING AGENTS**

First components

% by weight

	Comparative Example	Example 1	Example 2	Example 3	Example 4
Powder A	5				
Powder B		5			
Powder C			5		
Powder C-Ap				5	
Powder C-Pt					5
water	30	30	30	30	30
ethanol	61	61	61	61	61
iron chloride	1	1	1	1	1
sodium magnesium silicate	3	3	3	3	3

Second component

% by weight

glycerin	16.5
water	60
hydrogen peroxide	20
carboxy polymethylene	3
sodium hydroxide (pH adjusted)	0.5

of: The Powder A, Powder B, Powder C, Powder C-Ap and Powder C-Pt are as same as the powders written in the EXAMPLES of the present specification.

The Comparative example of the above table is as same as the Example 1 of the present specification.

**BLEACHING TESTS**

1. L\*value, a\*value and b\*value of the samples were measured by using a spectro-photometer (trade name: Easy shade, manufactured by GC Corporation).
2. For each of the Comparative example and the Examples 1 to 4, the first component was applied on the surface of the sample with brush and dried with air.
3. The second component was applied on the surface of the sample for each of the Comparative example and the Examples 1 to 4.
4. It was then followed by irradiation with a dental visible light irradiator (trade name: New light VLII, manufactured by GC Corporation) for five minutes per irradiation. The distance between the irradiator and the surface of the sample was about 1 cm.
5. Then, the surface of the samples were washed by water.
6. The above processes 2 to 5 were repeated 6 times.
7. For each of the Comparative example and the Examples 1 to 4 which was processed the above process 6, L\*value, a\*value and b\*value of the samples were measured by using a spectro-photometer (trade name: Easy shade, manufactured by GC Corporation).
8. For evaluating the bleaching effectiveness, color difference  $\Delta E$  defined by the following formula was calculated from the measured results in the process 1 and 7.

$$\Delta E = [(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2]^{1/2}$$

**TEST RESULTS**

	Comparative Example	Example 1	Example 2	Example 3	Example 4
bleaching effectiveness $\Delta E$	22.1	48.2	41.3	49.3	55.2

By this test results, it is clear that the Examples using nitrogen doped titanium oxide powder or titanium oxinitride powder are more effective in a bleaching agent as compared to titanium oxide powder.

Application Serial No.: 10/791,783

5. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

6. Further deponent saith not.

Shin Yamaguchi  
Shin Yamaguchi

January 5, 2007  
Date